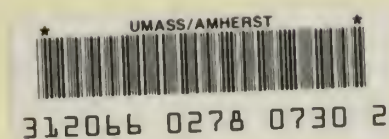


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HANSCOM AREA TRAFFIC STUDY: PHASE II

EXECUTIVE SUMMARY

July 1987



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HANSCOM AREA TRAFFIC STUDY

PHASE II

Executive Summary of CTPS Technical Report 60

This document was prepared by the **CENTRAL TRANSPORTATION PLANNING STAFF**, an interagency transportation-planning staff created and directed by the Metropolitan Planning Organization, which consists of the following agencies:

**Executive Office of Transportation and Construction
Massachusetts Bay Transportation Authority
Massachusetts Department of Public Works
MBTA Advisory Board
Massachusetts Port Authority
Metropolitan Area Planning Council**

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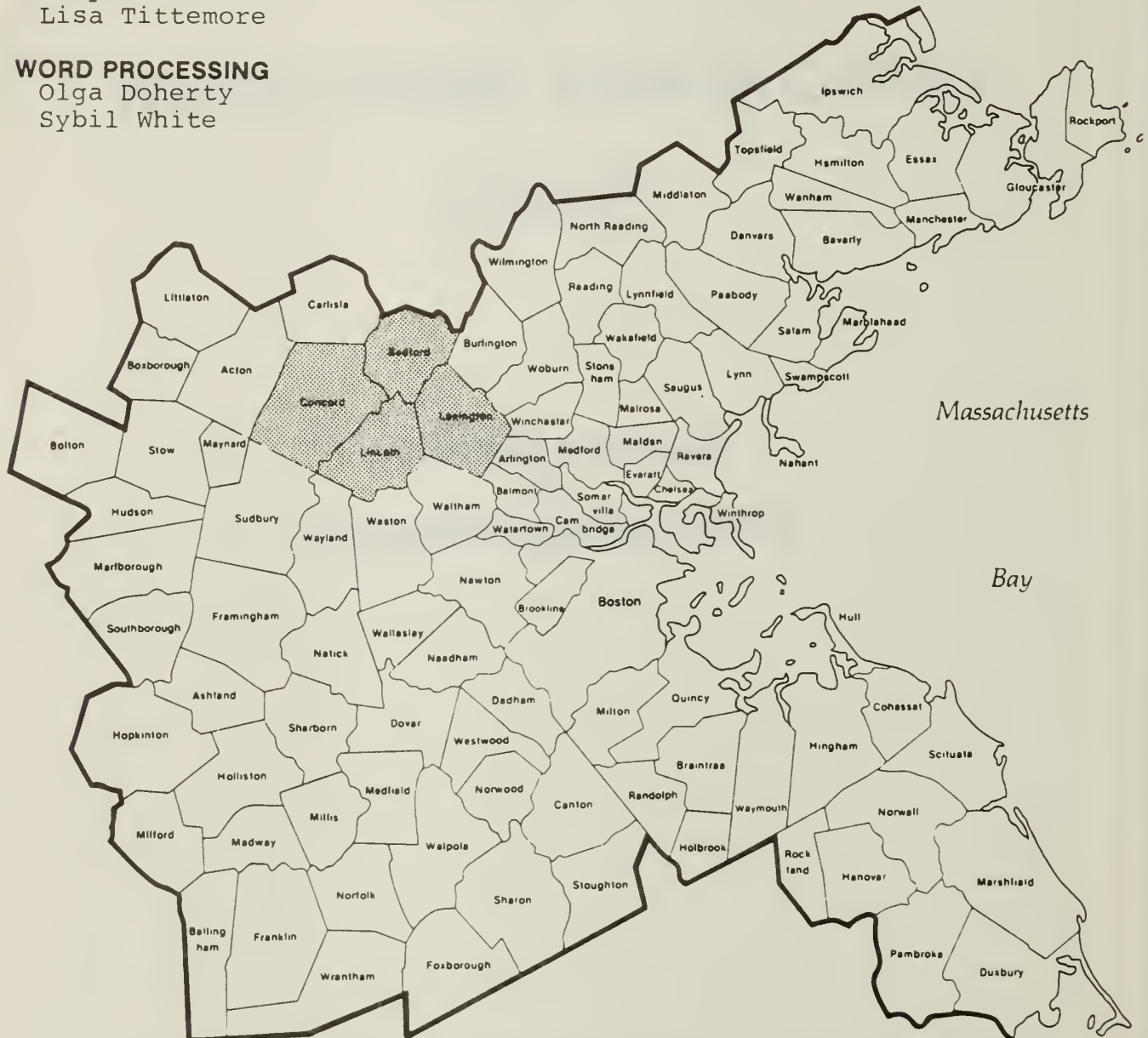
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This study was financed by:

Massachusetts Department of Public Works (Contract 23892)

Massachusetts Port Authority (H-626)

United States Air Force

National Park Service

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1 BACKGROUND

Phase II of the Hanscom Area Traffic Study was undertaken to evaluate seven alternative highway-network packages formulated by the HATS Committee, the Massachusetts Department of Public Works, and the National Park Service. The packages were derived from the recommendations of HATS Phase I, which examined three alignments of a ring road that would connect Route 2 on the west and Hartwell Avenue on the east.¹

The conclusions of HATS Phase I were as follows.

- o Without substantial roadway improvements, future traffic congestion in the traffic-impact area will reach unacceptable levels.
- o No ring road, by itself, can solve the area's traffic problems. Only by also upgrading Route 2 to expressway standards and building a Hartwell Avenue connector to Route 128 can traffic congestion be brought to acceptable levels throughout the roadway system.
- o Because of spill-over effects from the congested Route 3 corridor to the immediate north, improvements should be pursued in this corridor, specifically to Route 3 itself, before undertaking the construction of a ring road. Without this relief being provided in the Route 3 corridor, the benefits of a ring road to Route 4/225 traffic are quickly lost, owing to diverted traffic from Route 3.

The objective of Phase II was to identify the effects of certain "implementable" projects along the corridors of Route 2, Route 2A, and Routes 4/225 on the HATS highway network. The Phase II network covers the area located within the communities of Bedford, Concord, Lexington and Lincoln, between Route 3 and Route 117, west of Route 128.

¹Hanscom Area Traffic Study (CTPS Technical Report 44, July 1984) and accompanying Executive Summary.

2 CONCLUSIONS AND RECOMMENDATIONS

2.1 CONCLUSIONS

Parts of the roadway system in the HATS area suffer from excessive delays during the AM and PM peak hours. The higher volumes which are projected for the area in the future are expected to worsen travel conditions even further on problem roadway segments and to bring about congested conditions on segments not currently problematic.

The conclusions of this study regarding the proposed projects are summarized below (the locations of these projects are shown in Figure S-1). The reader should be reminded that the widening of Route 3 was an assumption in the analysis. This improvement is expected to have a positive impact on Route 3 itself and on the HATS highway network in general. The type of analysis given in this study to other improvements to the network was not given to the widening of Route 3, which was a component of the 1995 no-build case.

The Route 2 flyover at Crosby's Corner is successful in relieving congestion at the Corner, owing to the added capacity and the separation of the through from the local Route 2 traffic.

The Route 2/Bedford Road grade separation in Lincoln has minor adverse effects on Bedford Road south of Route 2, because it allows for certain movements which are presently prohibited.

The combined effect of the two Route 2 grade separations just mentioned is positive for Route 2 between Route 126 in Concord and Route 128 in Lexington. There is no effect on congestion on Route 2 west of Route 126. However, the positive impacts from the Route 2 improvements reach beyond its immediate corridor boundaries to Route 2A, Trapelo Road, Route 126, and Sandy Pond Road in Lincoln. The effect of the improvements on Route 117 is rather neutral.

The western relocation of Route 2A in Lincoln is successful in alleviating congestion at Merriam's Corner and on Route 2A at Hanscom Drive and east of it. Hanscom Drive is capable of carrying comfortably the traffic diverted off the present Route 2A. The closure of Airport Road is of minor benefit to Marrett Road and causes forced-flow conditions on Wood Street.

The eastern relocation of Route 2A is of benefit to the intersection of Route 2A with Hanscom Drive and, to some extent, to Route 2A east of that point.

The Hartwell Connector in Bedford and Lexington has localized positive impacts on Bedford Street and Wood Street in Lexington. It also attracts traffic from the area north of Routes 4/225 and from Hartwell Road via Wiggins Avenue and South Road, thus reversing the peak direction of travel in the evening on certain roadways in the area. The Hartwell Connector is of no benefit to Routes 4/225 west of Hartwell Avenue.

The widening of Bedford Street is also of localized benefit. However, the additional capacity encourages traffic to divert to it and then northbound to already congested north/south roadways, such as Route 62.

2.2 RECOMMENDATIONS

Route 2 (Concord, Lincoln, and Lexington)

The proposed improvements on Route 2 afford relief to Route 2 between Route 126 in Concord and Route 128 in Lexington. They also benefit Route 2A and other roadways in Lincoln. The improvements provide no relief to Route 2 west of Route 126, where travel conditions are expected to become worse in the future; therefore, the proposed improvements are not recommended as a mechanism to alleviate traffic congestion on Route 2 for its total length in the study area. Because the vehicle delays at Crosby's Corner and the high accident rate there (addressed in HATS Phase I) are excessive, and these delays affect other roadways in the vicinity as well, it is recommended that the flyover be given priority consideration over the grade separation at Bedford Road.

Route 2A (Lincoln and Lexington)

This roadway benefits far more from its western relocation than from its eastern relocation. However, looking at the Route 2A and Route 2 corridors together and comparing Route 2A benefits from even the full relocation to those from the Route 2 improvements shows that Route 2A travel conditions derive greater benefit from the Route 2 projects. Therefore, the western relocation can not be justified by traffic considerations alone if both of the Route 2 grade-separation projects are planned. However, it is recommended if only the flyover at Crosby's Corner is to be constructed.

Airport Road (Lexington)

Access to Airport Road should remain available to Air Force Base traffic: removing it would cause forced-flow conditions on Wood Street.



Package No.	Locations of Projects Included
1	D,E,G
2	D,E,F
3	A,B,C,D,G
4	A,B,C,D,F
5	D,G
6	D,F
7	A,B,C,D,E,G

Location No.	Name of Project*
A	Route 2, Four-lane, Median Divided
B	Crosby's Corner Fly-over
C	Route 2 / Bedford Road, Grade Separation
D	Eastern Relocation of Route 2A
E	Western Relocation of Route 2A
F	Bedford Street, Widening to Four Lanes
G	Hartwell Connector

* For full description, see text.

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LOCATIONS OF PROJECTS INCLUDED IN THE
ALTERNATIVE HIGHWAY-NETWORK PACKAGES

CTPS
FIGURE
S-1

Hartwell Connector (Bedford and Lexington)

The proposed Hartwell Connector is projected to be less effective than expected, clearly not capable of restoring acceptable travel conditions on Routes 4/225. Therefore, pursuing it further is not recommended until improvements are made on Route 128.

Bedford Street (Lexington)

The proposed widening of Bedford Street offers virtually no relief to any portion of Routes 4/225 in the study area, and is not recommended. Solutions to the traffic problems of this corridor may possibly be found in transportation-systems-management (TSM) measures for improving traffic operations at intersections and along roadway links.

3 ALTERNATIVE HIGHWAY-NETWORK PACKAGES

3.1 MINIMUM AND MAXIMUM IMPACT SCENARIOS

Phase II of the Hanscom Area Traffic Study has dealt with seven alternative highway packages which were formulated from scenarios recommended by the HATS Committee for study. The number of scenarios recommended initially was too large to be given an appropriate level of analysis. A manageable set of scenarios was developed in the following manner. CTPS first grouped the scenarios in the initial set by subarea or corridor within the study area. Three areas were revealed to be of concern to all committee members: the corridors of Route 2, Route 2A, and Routes 4/225. Next, from the description of the initial scenarios and in consultation with representatives of the study's funding agencies, minimum and maximum impact scenarios were defined for each of the three corridors, as documented in the CTPS memorandum, "HATS II Alternative Packages" (Efi Pagitsas, December 26, 1985). The definitions of these scenarios given below are taken from this memorandum. Figure S-1 locates the projects implied by the scenarios on a map of the area.

Route 2 Corridor

Minimum: "Existing (1985) condition."

Maximum: "Grade separation of the intersections Route 2/Cambridge Cutoff (Crosby's Corner) in Concord and Route 2/Bedford Road in Lincoln."

This has been taken to mean the following.

- o Route 2 between Bedford Road and Brooks Road (Location 1) is a four-lane (two lanes in each direction), median-divided facility.
- o Immediately west of the location Route 2/Brooks Road in Lincoln, commences a flyover, two-lane, one-way westbound segment of Route 2 which terminates at the intersection of Route 2 with Sandy Pond Road in Concord. The eastbound segment of Route 2 between Sandy Pond Road and Brooks Road is constructed at grade as a two-lane facility (Location 2).

- o The present intersection at Crosby's Corner is maintained as is, for the accommodation of local traffic between Concord Center and Routes 2 and 2A. The present section of Route 2 between Sandy Pond Road and Crosby's Corner becomes a two-lane slip off/on ramp to Route 2. The segment of Route 2 between Crosby's Corner and Brooks Road also becomes a two-lane slip on/off ramp. The traffic signal and the roadway widths of the Cambridge Turnpike and Cambridge Cutoff remain as they are.
- o The signalized intersection of Route 2/Bedford Road in Lincoln (Location 3) is replaced by a grade-separated interchange. Bedford Road, which becomes a flyover at the point where it intersects with Route 2, is maintained at its present width.

Route 2A Corridor

Minimum: "New road between Hanscom Drive and new Massachusetts Avenue with Route 2A and Old Massachusetts Avenue closed. Merriam's Corner, Airport Road, Mill Street and Bedford Road remain open."

This has been taken to mean the following.

- o Relocation of the eastern portion of Route 2A between Hanscom Drive in Lincoln and Massachusetts Avenue in Lexington (Location 4). The roadway width of the relocated Route 2A remains as is.
- o Old Massachusetts Avenue is closed to traffic.
- o Hanscom Drive and Airport Road are extended southward to connect with the relocated Route 2A. Mill Street also connects with the new Route 2A.
- o Route 2A west of Hanscom Drive remains at its present alignment, with traffic access to all currently intersecting roadways.

Maximum: "New road between Hanscom Drive and Massachusetts Avenue with all crossroads closed. Route 2A closed between Merriam's Corner and Hanscom Drive. New Route 2A from Crosby's Corner to Virginia Road, Airport Road closed."

This has been taken to mean the following.

- o Relocation of Route 2A between Hanscom Drive and Massachusetts Avenue (Location 4); Hanscom Drive extended to the new alignment of Route 2A; no traffic access to Airport Road; Old Massachusetts Avenue closed.
- o Route 2A west of Hanscom Drive to Crosby's Corner, and Lexington Road from Route 2A to Merriam's Corner (Lexington Road at Old Bedford Road) are closed. No traffic access is provided to Bedford Road, Bedford Lane, Sunnyside Lane, and Brooks Road.
- o Construction of a two-lane, undivided roadway (Location 5) commencing at the Route 2/Route 2A intersection (Crosby's Corner) in Concord and proceeding over the existing Route 2A (Cambridge Cutoff) right-of-way to the present Route 2A/Lexington Road intersection. Continuing in a northeasterly direction, the proposed connector intersects with Virginia Road, at grade, at a point to the north of Old Bedford Road in Lincoln, where it also terminates. Upgrading of Virginia Road between the connector and Old Bedford Road.

Routes 4/225 Corridor

Minimum: "Improve Bedford Street to four lanes."

- o This has been taken to mean the reconstruction of Bedford Street (Routes 4/225 in Lexington, Location 6) between Hartwell Avenue and Route 128 to a four-lane, undivided roadway.

Maximum: "Extension of Wiggins Avenue to Hartwell Avenue and thence to Route 128."

- o This has been taken to mean the construction of a four-lane Hartwell Avenue Connector (Location 7) commencing at the intersection of Wiggins Avenue with Summer Street in Bedford. From this point, it proceeds southward as an extension of Wiggins Avenue until reaching the vicinity of the northeast corner of the Massport property line. Then it proceeds in a generally southeasterly direction in Lexington, where it intersects with Hartwell Avenue and Route 128. The connection with Route 128 is assumed to be a system of slip on/off ramps and service roadways.

3.2 FORMULATION OF ALTERNATIVE PACKAGES

The seven alternative packages are combinations of the minimum and maximum impact scenarios for the three corridors, as shown in the table below.

The HATS Phase II Alternative Packages as
Combinations of Minimum and Maximum Scenarios
for the Corridors of Rt. 2, Rt. 2A and Rts. 4/225

<u>Corridor</u>	<u>Alternative Packages</u>						
	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>	<u>6</u>	<u>7</u>
Route 2	Min	Min	Max	Max	Min	Min	Max
Route 2A	Max	Max	Min	Min	Min	Min	Max
Routes 4/225	Max	Min	Max	Min	Max	Min	Max

Figure S-1 (page 5) provides a definition of each package in terms of the specific projects it comprises.

In addition, to the projects included in any package, it is assumed that, by the year 1995: two more lanes (one per direction) will have been added to Route 3 between Route 128 and the Burlington town line; and a two-lane "jug handle" ramp for left turns will have been constructed at the intersection of Bedford Street (Routes 4/225) with Hartwell Avenue.

4 IMPACT ANALYSIS OF ALTERNATIVE HIGHWAY-NETWORK PACKAGES

This chapter provides a broad summary of impacts, by package, on the HATS network as a whole. The arrangement of the first six packages is such that it calls for the analysis of their impacts in pairs: Packages 1 and 2, 3 and 4, and 5 and 6. The two packages in each pair are identical in terms of improvements in the Route 2 and Route 2A corridors and different in the treatment of the Route 4/225 corridor in Bedford and Lexington. The analysis of each pair will begin with the first two corridors and continue with comparison of the Hartwell Connector and the widening of Bedford Street in the latter corridor. For the locations of the projects examined in this study, the reader is again referred to Figure S-1.

The AM- and PM-peak-hour travel conditions for the 1985 base case, the 1995 no-build case, and the seven alternative packages are presented graphically in Figures S-2 through S-19.

Packages 1 and 2

The full relocation of Route 2A benefits a number of roadway segments along this corridor: the relocated Route 2A east of Hanscom Drive, the Cambridge Cutoff east of Crosby's Corner (actually a portion of the relocated Route 2A), Lexington Road west of Merriam's Corner, Old Bedford Road in Concord south of Route 62, Mill Street in Lincoln, and Bedford Street in Lincoln.

The negative traffic impacts are generally minor, with one exception. The closure of Airport Road has a serious impact on Wood Street in Lexington. Hartwell Avenue is somewhat negatively affected, for the same reason. One of the more notable minor impacts is on Virginia Road in Lincoln, in the northbound direction during the PM peak hour. Congestion increases here because higher volumes are attracted following the closure of the present Route 2A between Hanscom Drive and Merriam's Corner.

In Package 1, the Hartwell Connector affects a number of roadway segments. Positively affected segments include Wood Street, Bedford Street, Westview Street, Maguire Road, and Hartwell Avenue (between Bedford Street and Maguire Road) in Lexington, and Page Road, Pine Hill Road, Winter Street, and Spring Road (north of Pine Hill Road) in Bedford. Negatively impacted roadways are Spring Road (south of Pine Hill Road),

Route 62 (between Routes 4/225 and Page Road), South Street, and Wiggins Avenue. Generally, it is expected that the Hartwell Connector will attract--via Spring Road, Route 62, Wiggins Avenue, and, to some extent, South Street--traffic presently using Pine Hill and Page roads. The nature of the connector's impact is further explained in the portion of section 3.2 that discusses support roadways in northern Bedford and northern Lexington between Routes 4/225 and Route 3.

In Package 2, the widening of Bedford Street provides traffic relief to Bedford Street only. Generally, it encourages the processing of additional traffic via Bedford Street to and from north/south roadways such as Route 62, Spring Road, Billerica Road, and North Road. Routes 4/225, between Hartwell Avenue and North Road, are also somewhat negatively affected.

Packages 3 and 4

These packages are favorable to the corridor of Route 2 east of Route 126, the corridor of Route 2A east of Merriam's Corner, and, quite extensively, the area south of Route 2. The main reason for the benefits is the grade separation of Route 2 at two locations; a secondary reason is the eastern relocation of Route 2A. The grade separation at Crosby's Corner and Bedford Road is expected to be particularly beneficial, reducing delays and thereby increasing capacity along Route 2 between Route 126 and Route 128. The increased capacity is expected to attract traffic presently on Route 2A and Trapelo Road. Other positively impacted roadway segments are Route 126 south of Route 2, Baker Bridge Road, Sandy Pond Road, Mill Street, Lexington Road, and Old Bedford Road (Concord). Roadway segments which are adversely affected are the Cambridge Turnpike in Concord and Bedford Road in Lincoln. These roadways are projected to suffer somewhat from the facilitation of traffic movements via Crosby's Corner and the grade separation of the intersection of Route 2 with Bedford Road. However, the increase in traffic is slight, and not sufficient to alter the present travel conditions at Concord Center or Lincoln Five Corners.

The impacts of the Hartwell Avenue Connector (Package 3) and the widening of Bedford Street (Package 4) are expected to be as described for Packages 1 and 2, with the exception that in Package 3 Wood Street is projected to operate at acceptable congestion levels. In this case Airport Road is open and the Hartwell Connector attracts traffic from Wood Street.

Packages 5 and 6

Under these packages, Route 2 is projected to have the same congestion level as in the future no-build case. Route 2A benefits less from its eastern relocation, however, than under the previous four packages; the improvement in travel conditions is expected to be primarily between Airport Road and Merriam's Corner, in both directions.

The Hartwell Connector in Package 5 and the widening of Bedford Street in Package 6 have approximately the same impacts as in Packages 1 and 2.

Package 7

This package contains the largest number of positively affected roadway segments in the areas along Route 2 and Route 2A. However, the travel conditions along them are within roughly the same congestion-level categories as under Packages 1, 2, 3, and 4. These positively impacted roadway segments are concentrated along and to the south of the relocated Route 2A, east of Crosby's Corner. West of Crosby's Corner, along and to the north of Route 2, the impact of this package is rather neutral. The closure of Airport Road has approximately the same negative impacts on Wood Street as in Packages 1 and 2.

The effect of the Hartwell Connector is the same as discussed for Packages 1 and 2.

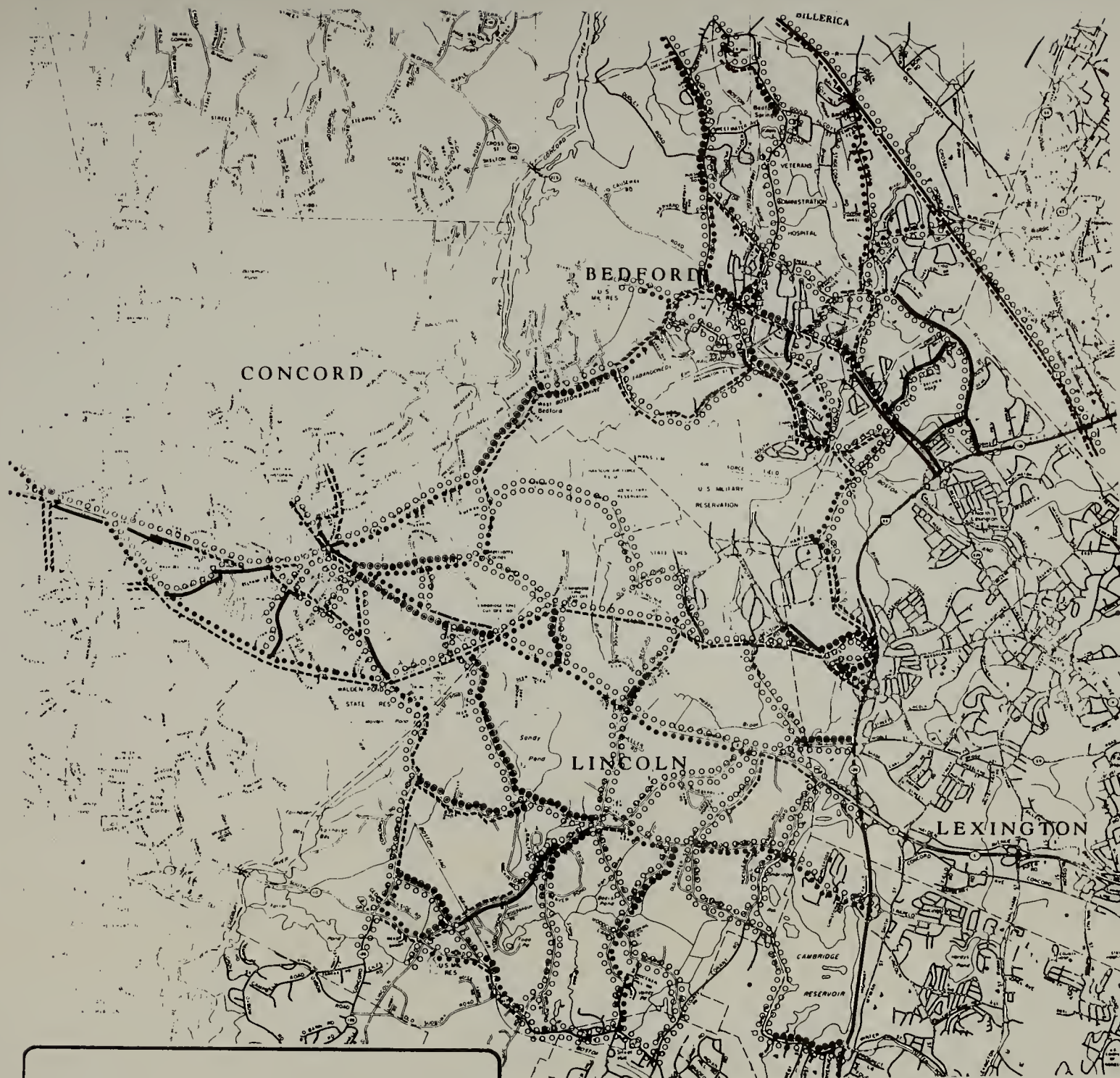
Comparison of Packages

In summary, Package 7 provides the most traffic-flow improvements, followed by Packages 3 and 4, Packages 1 and 2, and Packages 5 and 6. The ranking of packages within pairs is not clear, although careful evaluation of the overall impacts from the widening of Bedford Street and the Hartwell Connector suggests that the widening is marginally more beneficial than the connector.

TRAVEL CONDITIONS
IN THE AM AND PM PEAK HOURS

1985 Base Case
1995 No-Build Case
Packages 1 - 7

Figures S-2 - S-19
(itemized in List of Figures, p. v)



LEGEND

CONGESTION LEVEL	VOLUME/CAPACITY RANGE	DESCRIPTION OF TRAVEL CONDITIONS
○ ○ ○ ○	0.00-0.59	TRITE VOLUMES OF RELATIVELY FREE FLOWING TRAFFIC
● ● ● ●	0.60-0.79	Moderate VOLUMES OF RELATIVELY SMOOTHLY FLOWING TRAFFIC
● ● ● ●	0.80-0.94	MODERATE TO HEAVY VOLUMES OF RELATIVELY SLOW BUT STEADILY MOVING TRAFFIC
— — — —	0.95-1.14	HEAVY VOLUMES OF RELATIVELY SLOW TRAFFIC SUBJECT TO FLUCTUATIONS IN OPERATING CONDITIONS AND RESTRICTIONS TO LOW OF A HIGH PRIORITY NATURE
— — — —	1.15-1.40	VOLUMES THAT SUBSTANTIALLY EXCEED THE CAPACITY OF THE ROADWAY WITH RESULTANT UNSTABLE FLOW AND STOPPAGE, OCCURRING FOR EXTENDED PERIODS OF TIME POSSIBLE
— — — —	1.50*	

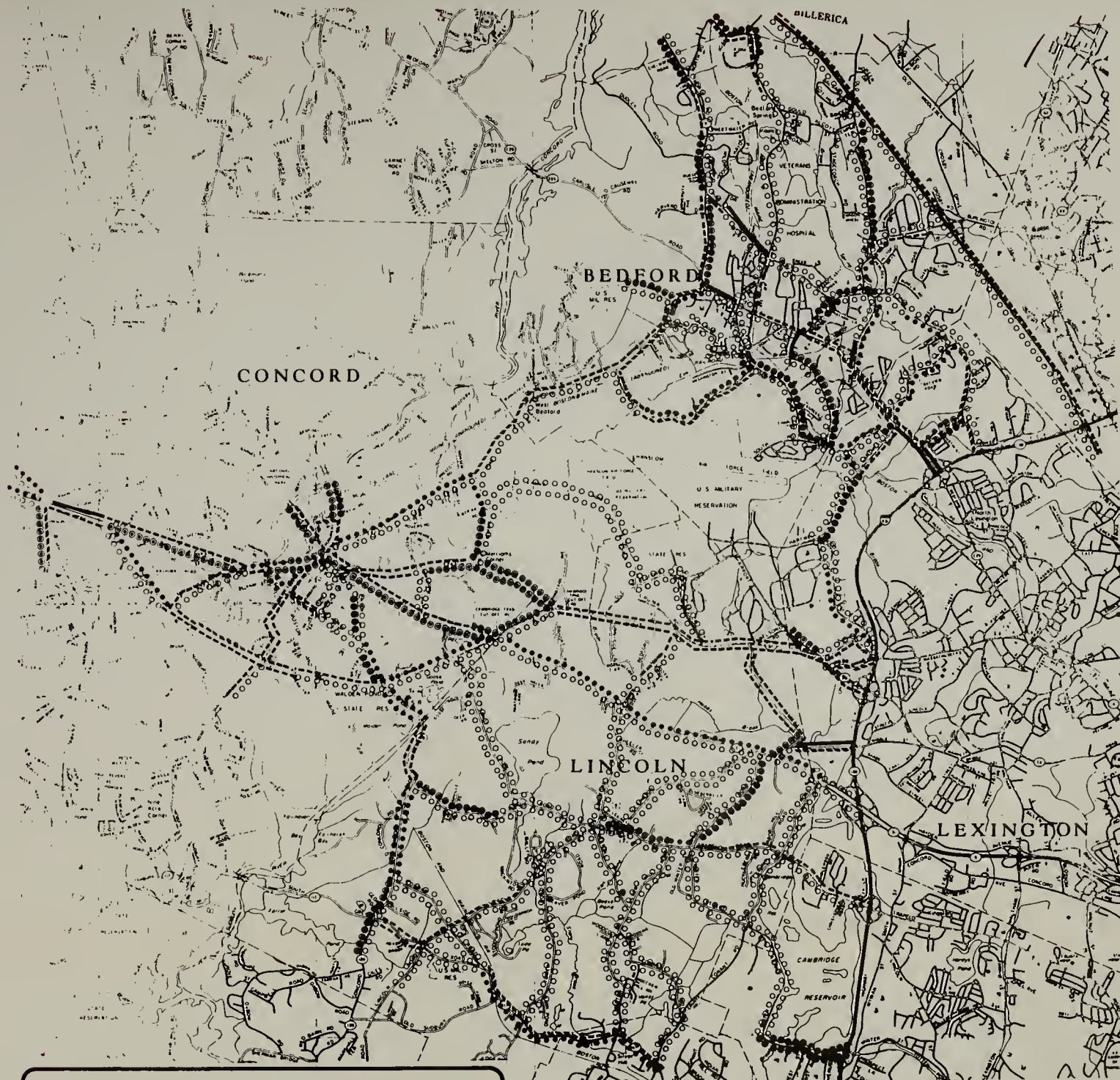
Hanscom Area Traffic Study:
Phase II

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1985 BASE TRAVEL CONDITIONS,
AM PEAK HOUR

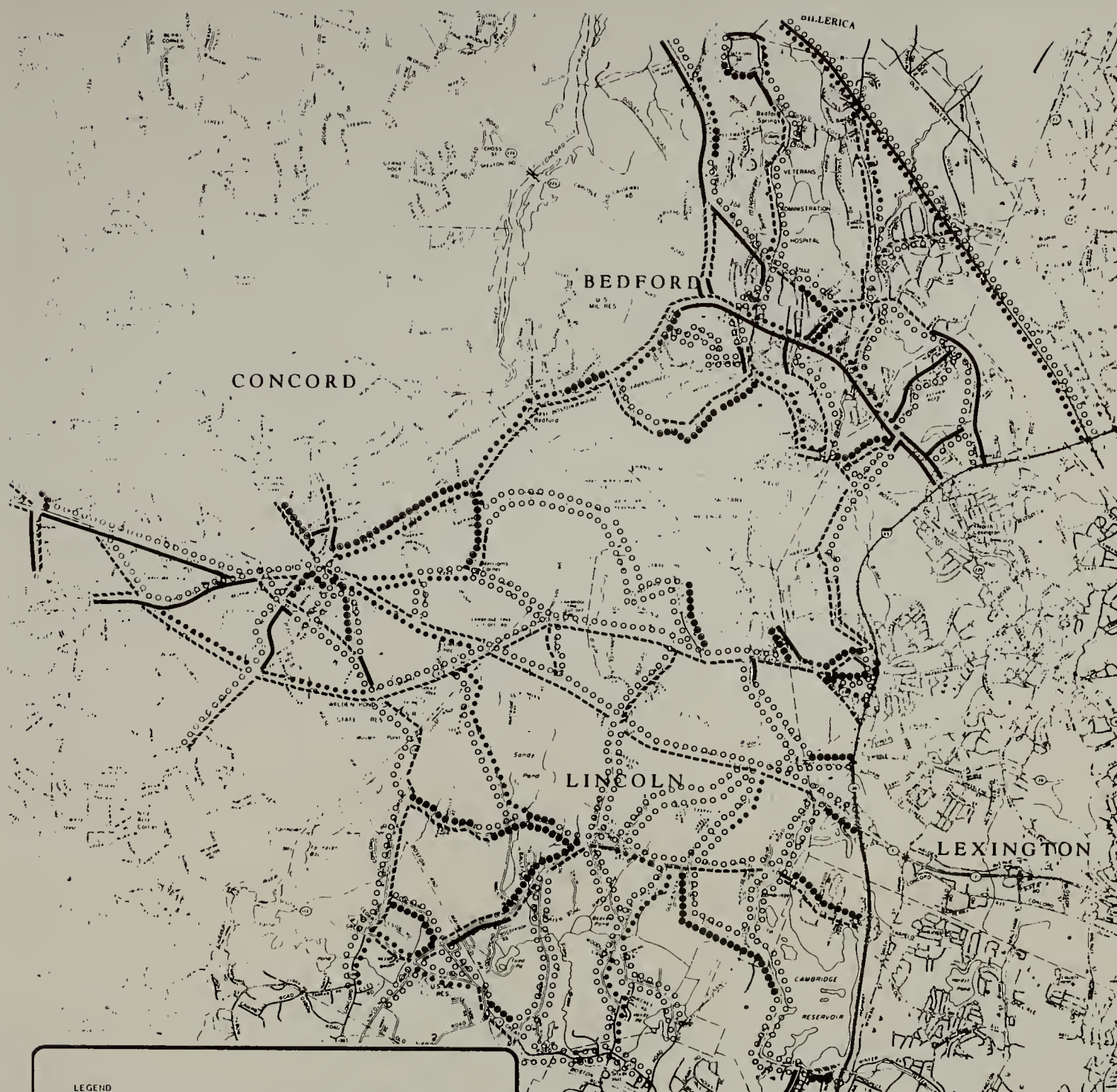
CTPS

FIGURE
S-2



LEGEND

CONGESTION LEVEL	VOLUME CAPACITY RANGE	DESCRIPTION OF TRAVEL CONDITIONS
○ ○ ○ ○ ○	00.0 - 0.59	1. FREE FLOWING TRAFFIC WITH NO DELAYS
● ● ● ● ●	0.60 - 0.79	2. FREE FLOWING TRAFFIC WITH MINOR DELAYS
● ● ● ● ●	0.80 - 0.94	3. FREE FLOWING TRAFFIC WITH MODERATE DELAYS
— — — — —	0.95 - 1.14	4. FREE FLOWING TRAFFIC WITH SEVERE DELAYS
— — — — —	1.15 - 1.49	5. FREE FLOWING TRAFFIC WITH EXTREME DELAYS
— — — — —	1.50+	6. FREE FLOWING TRAFFIC WITH EXTREME DELAYS



LEGEND

CONGESTION LEVEL	VOLUME/CAPACITY RANGE	DESCRIPTION OF TRAVEL CONDITIONS
○ ○ ○ ○	00-0.59	LIGHT VOLUMES OF RELATIVELY FREE FLOWING TRAFFIC
● ● ● ●	0.60-0.79	MODERATE VOLUMES OF RELATIVELY SMOOTHLY FLOWING TRAFFIC
• • • •	0.80-0.94	MODERATE TO HEAVY VOLUMES OF RELATIVELY SLOW BUT STEADILY MOVING TRAFFIC
— — — —	0.95-1.14	HEAVY VOLUMES OF RELATIVELY SLOW TRAFFIC, SUBJECT TO FLUCTUATIONS IN OPERATING CONDITIONS AND RESTRICTIONS TO FLOW OF A TEMPORARY NATURE
— — — —	1.15-1.49	VOLUMES THAT SUBSTANTIALLY EXCEED THE CAPACITY OF THE ROADWAY WITH RELATIVELY UNSTABLE FLOW AND STOPPAGE OCCURRING FOR EXTENDING PERIODS OF TIME POSSIBLE
— — — —	1.50+	

Hanscom Area Traffic Study:
Phase II

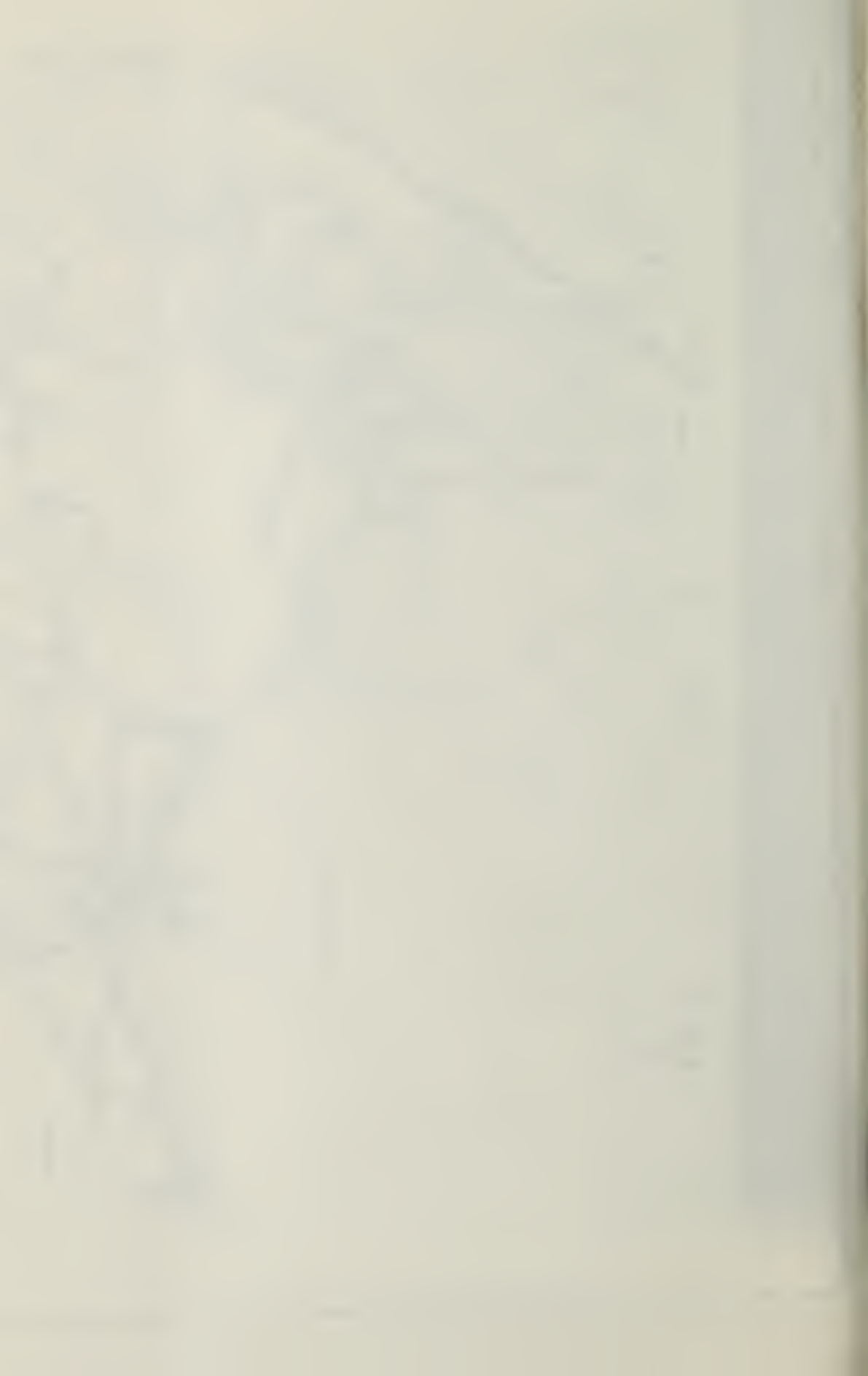
Executive Summary of Technical Report 60, July 1987

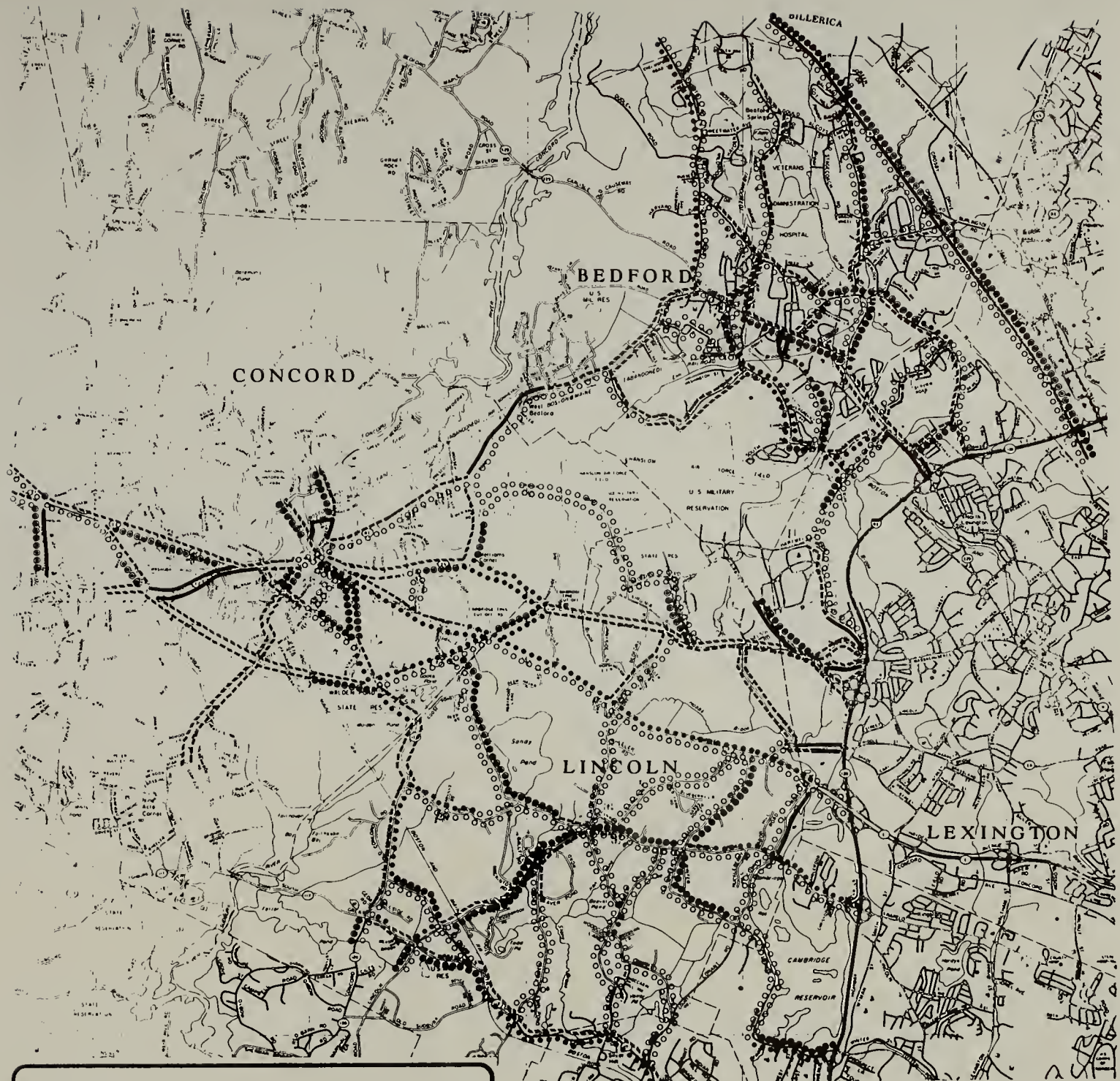
1995 NO-BUILD TRAVEL CONDITIONS, AM PEAK HOUR

CTPS

FIGURE

S-4





LEGEND

CONGESTION LEVEL	VOLUME/CAPACITY RANGE	DESCRIPTION OF TRAVEL CONDITIONS
○ ○ ○ ○	00-0.59	LIGHT VOLUMES OR RELATIVELY FREE FLOWING TRAFFIC
● ● ● ●	0.60-0.79	MODERATE VOLUMES OR RELATIVELY SMOOTHLY FLOWING TRAFFIC
● ● ● ●	0.80-0.94	HEAVY VOLUMES OR RELATIVELY SLOW BUT STILL MOVING TRAFFIC
----	0.95-1.14	HEAVY VOLUMES OR RELATIVELY SLOW TRAFFIC SUBJECT TO FLUCTUATIONS IN FLOW RATING CONDITIONS AND IN SITUATIONS OF LOW OR A TEMPERED FLOW
----	1.15-1.49	VOLUMES THAT SUBSTANTIALLY EXCEED THE CAPACITY OF THE ROADWAY WITH SEVERE TRAFFIC FLOW AND STOPPAGE OCCURRING FOR EXTENDED PERIODS OF TIME POSSIBLE
----	1.50+	

Hanscom Area Traffic Study:
Phase II

1995 NO-BUILD TRAVEL CONDITIONS, PM PEAK HOUR

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FIGURE

S-5



LEGEND

CONGESTION LEVEL	VOLUME/CAPACITY RANGE	DESCRIPTION OF TRAVEL CONDITIONS
1	0.00-0.59	FREE FLOWING TRAFFIC WITH MINIMAL DELAYS
2	0.60-0.79	SLIGHTLY CONGESTED TRAFFIC WITH MINIMAL DELAYS
3	0.80-0.94	MODERATELY CONGESTED TRAFFIC WITH MODERATE DELAYS
4	0.95-1.14	HEAVILY CONGESTED TRAFFIC WITH HEAVY DELAYS
5	1.15-1.49	EXTREMELY CONGESTED TRAFFIC WITH EXTREME DELAYS
6	1.50+	COMPLETELY STOPPED TRAFFIC

Hanscom Area Traffic Study:
Phase II

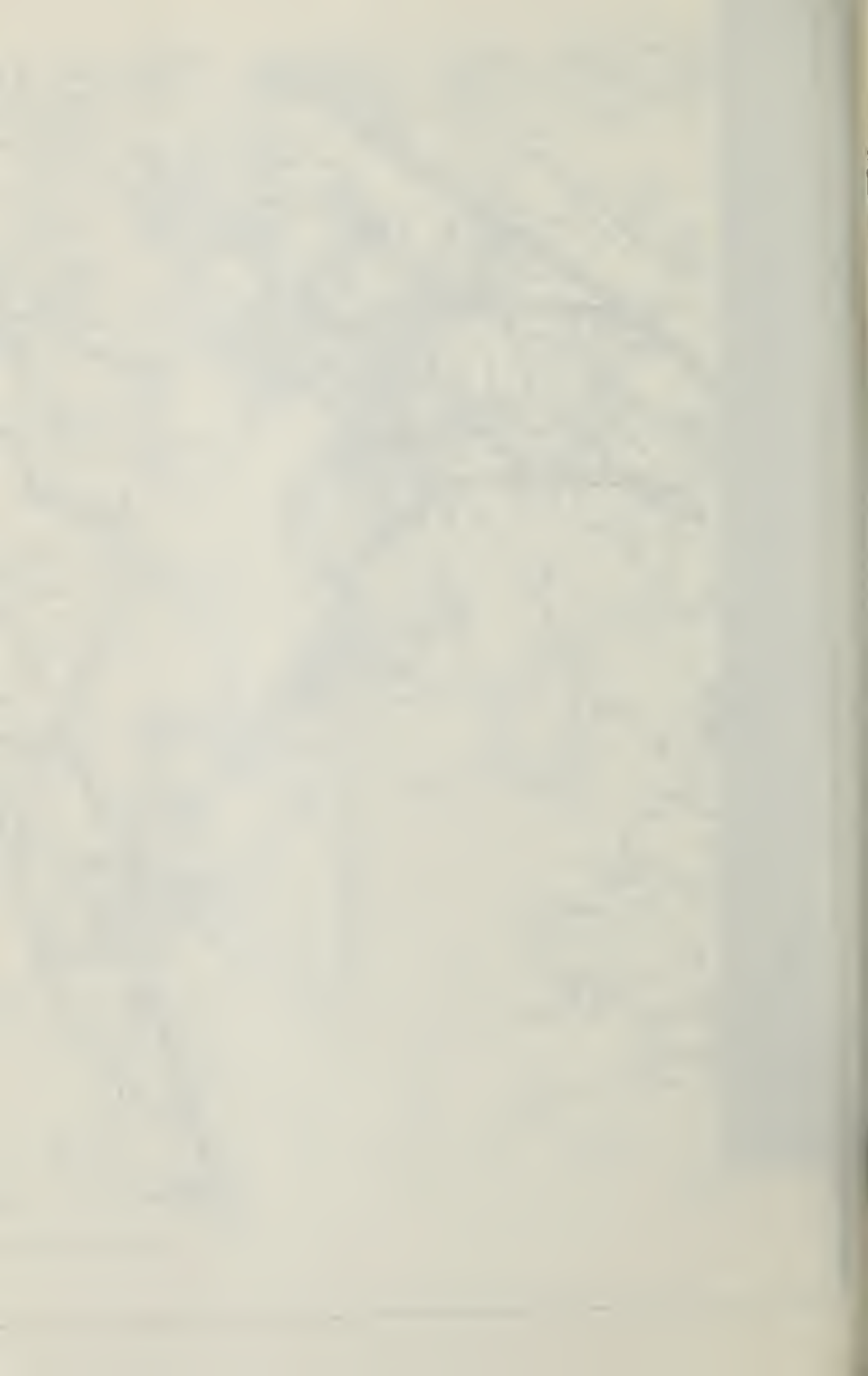
Executive Summary of Technical Report 60, July 1987

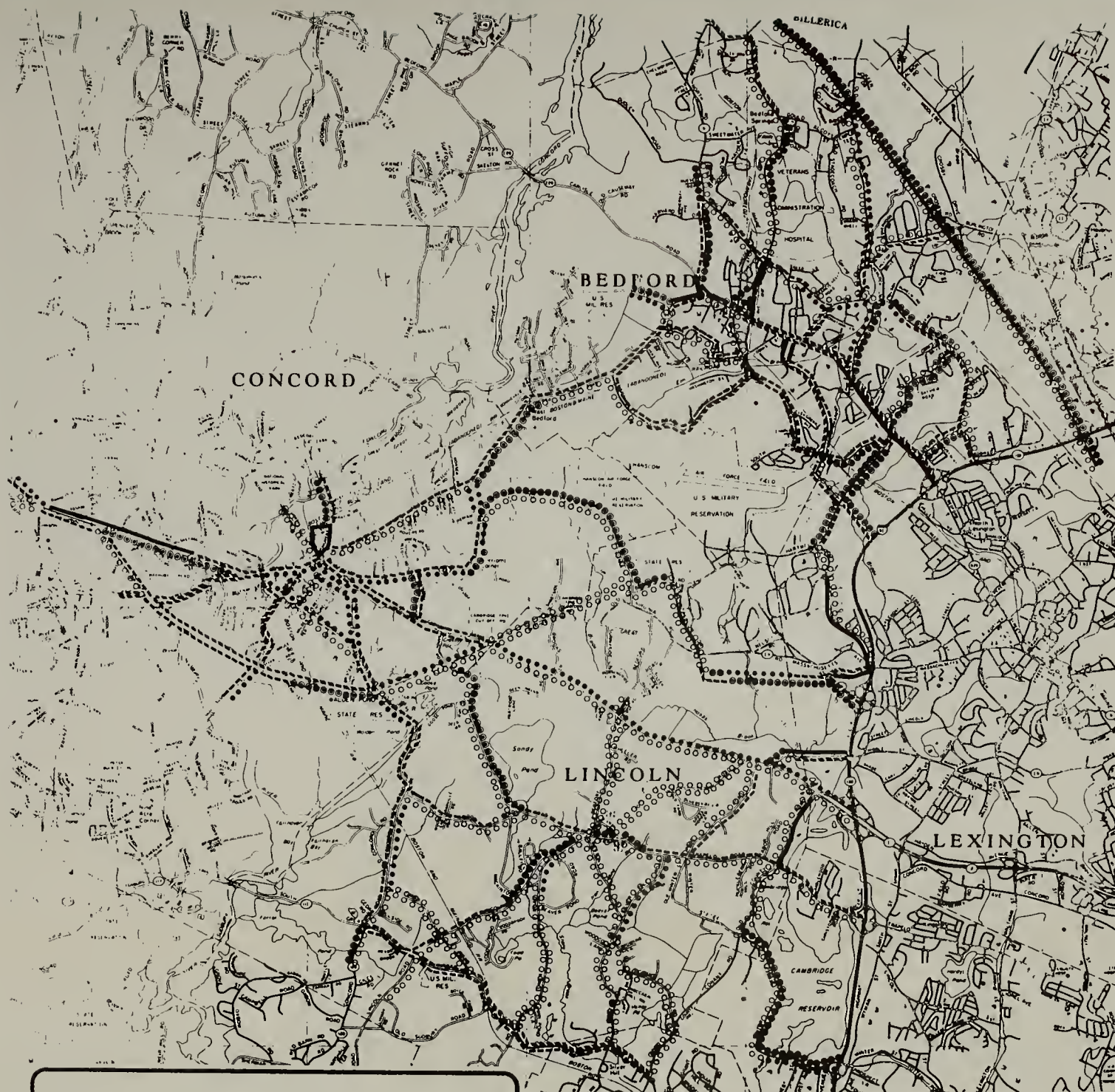
PACKAGE 1 TRAVEL CONDITIONS, AM PEAK HOUR

CTPS

FIGURE

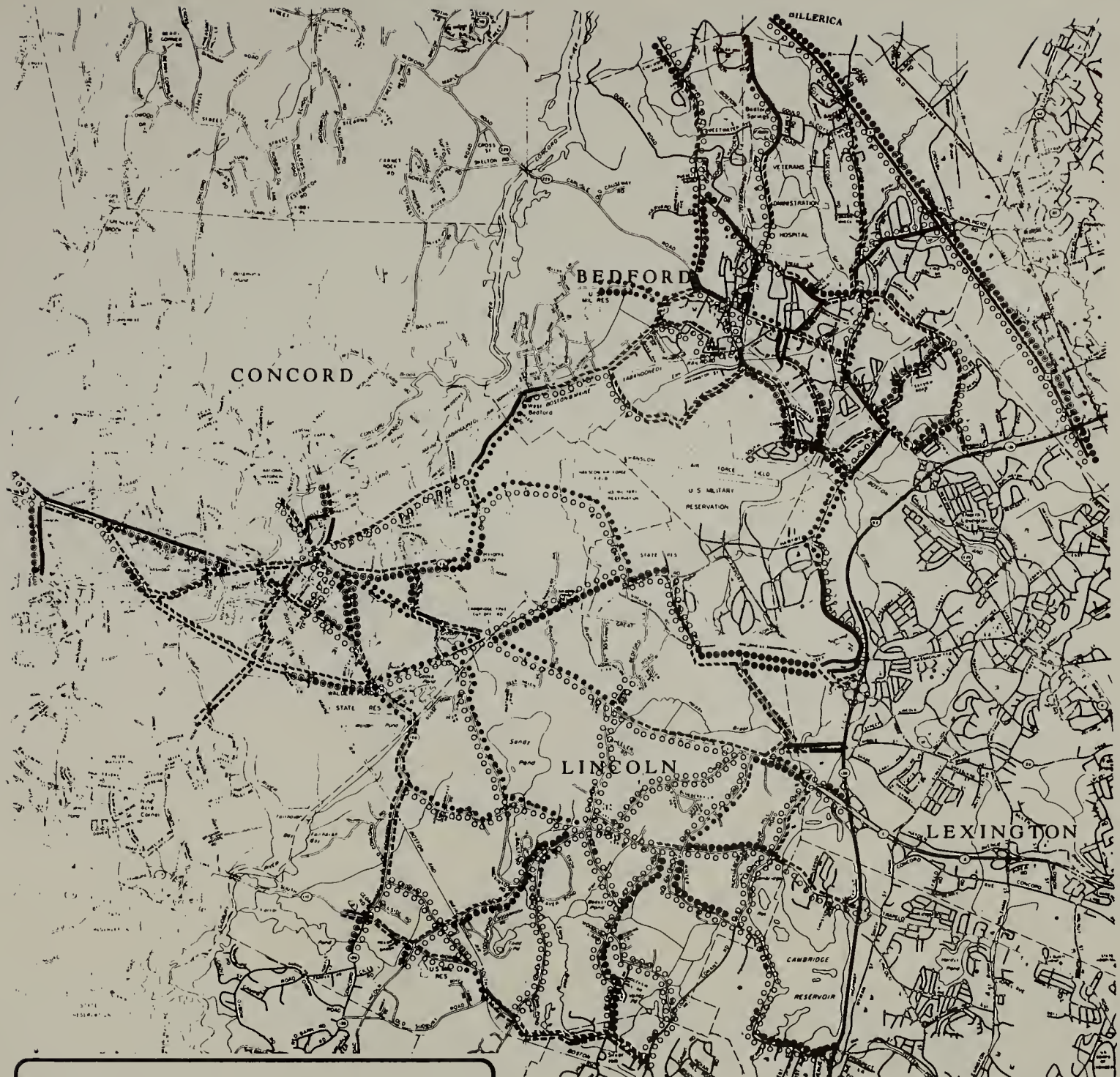
S-6





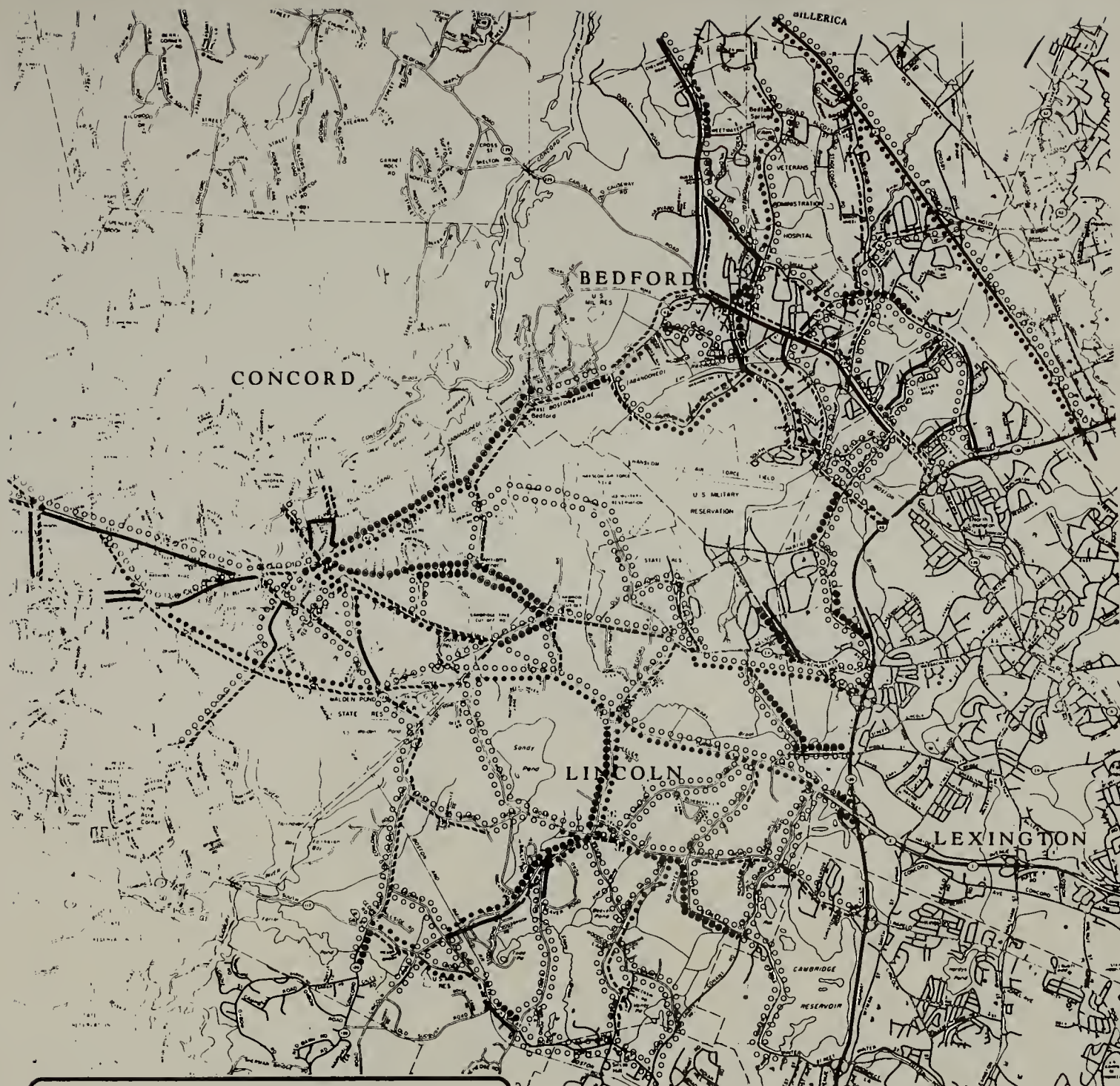


LEGEND			
CONGESTION LEVEL	VOLUME/CAPACITY RANGE	DESCRIPTION OF TRAVEL CONDITIONS	
○ ○ ○ ○	1	00-0.59	LIGHT VOLUMES OF RELATIVELY FREE FLOWING TRAFFIC
● ● ● ● ●	2	0.60-0.79	MODERATE VOLUMES OF RELATIVELY SMOOTHLY FLOWING TRAFFIC
● ● ● ●	3	0.80-0.94	MODERATE TO HEAVY VOLUMES OF RELATIVELY SLOW BUT STEADILY MOVING TRAFFIC
— — — —	4	0.95-1.14	HEAVY VOLUMES OF RELATIVELY SLOW TRAFFIC SUBJECT TO FLUCTUATIONS IN OPERATING CONDITIONS AND RESTRICTIONS TO FLOW OF A TEMPORARY NATURE
— — — —	5	1.15-1.49	VOLUMES THAT SIGNIFICANTLY EXCEED THE CAPACITY OF THE HIGHWAY WITHIN SURFABLE FLOW AND SURFACE EXCEEDING FOR EXISTING PAVEMENTS OF THAT TYPE
— — — —	6	1.50+	



LEGEND

CONGESTION LEVEL	VOLUME/CAPACITY RANGE	DESCRIPTION OF TRAVEL CONDITIONS
0 0 0 0	1	0.00-0.59 LIGHT VOLUMES OF RELATIVELY FREE FLOWING TRAFFIC
● ● ● ● ●	2	0.60-0.79 MODERATE VOLUMES OF RELATIVELY SMOOTHLY FLOWING TRAFFIC
● ● ● ●	3	0.80-0.94 MODERATE TO HEAVY VOLUMES OF RELATIVELY SLOW BUT STEADILY MOVING TRAFFIC
— — — —	4	0.95-1.14 HEAVY VOLUMES OF RELATIVELY SLOW TRAFFIC, SUBJECT TO FLUCTUATIONS IN OPERATING CONDITIONS AND RESTRICTIONS TO FLOW OF A TEMPORARY NATURE
— — — —	5	1.15-1.49 VOLUMES THAT SUBSTANTIALLY EXCEED THE CAPACITY OF THE ROADWAY WITH RELATIVELY UNSTABLE FLOW AND STOPPAGE OCCURRING FOR EXTENDED PERIODS OF TIME, POSSIBLE
— — — —	6	1.50+



LEGEND

CONGESTION LEVEL	VOLUME/CAPACITY RANGE	DESCRIPTION OF TRAVEL CONDITIONS
1	0.00-0.59	Light traffic, relatively free flowing traffic.
2	0.60-0.79	Light to moderate traffic, relatively free flowing traffic.
3	0.80-0.94	Moderate to heavy traffic, relatively slow but still free flowing traffic.
4	0.95-1.14	Heavy traffic, relatively slow traffic, subject to interruptions in flow during peak hours and restrictions to flow at certain points.
5	1.15-1.40	Very heavy traffic, subject to interruptions in flow during peak hours and restrictions to flow at certain points.
6	1.50+	Extremely heavy traffic, subject to interruptions in flow during peak hours and restrictions to flow at certain points.

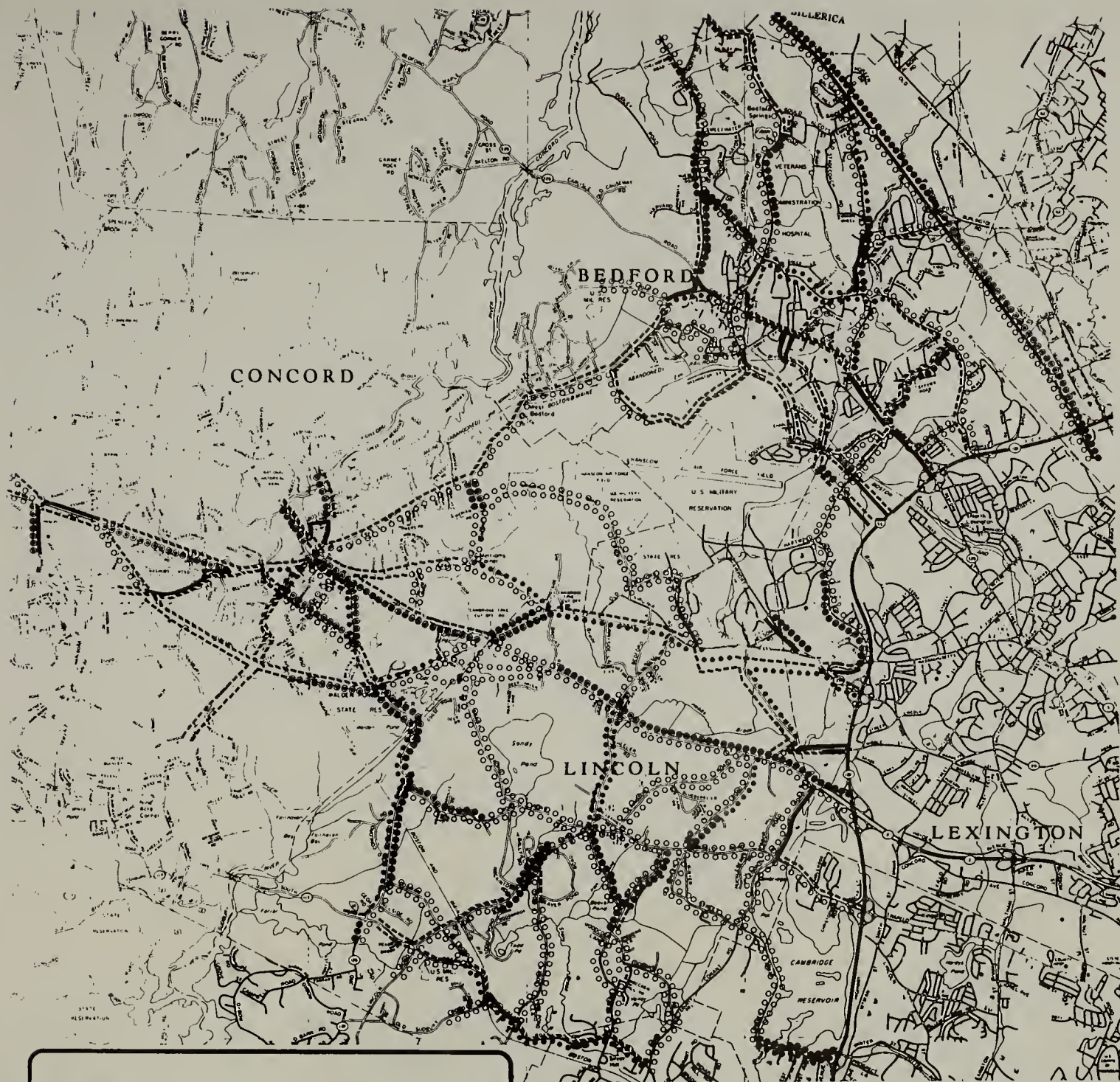
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PACKAGE 3 TRAVEL CONDITIONS, AM PEAK HOUR

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FIGURE
S-10



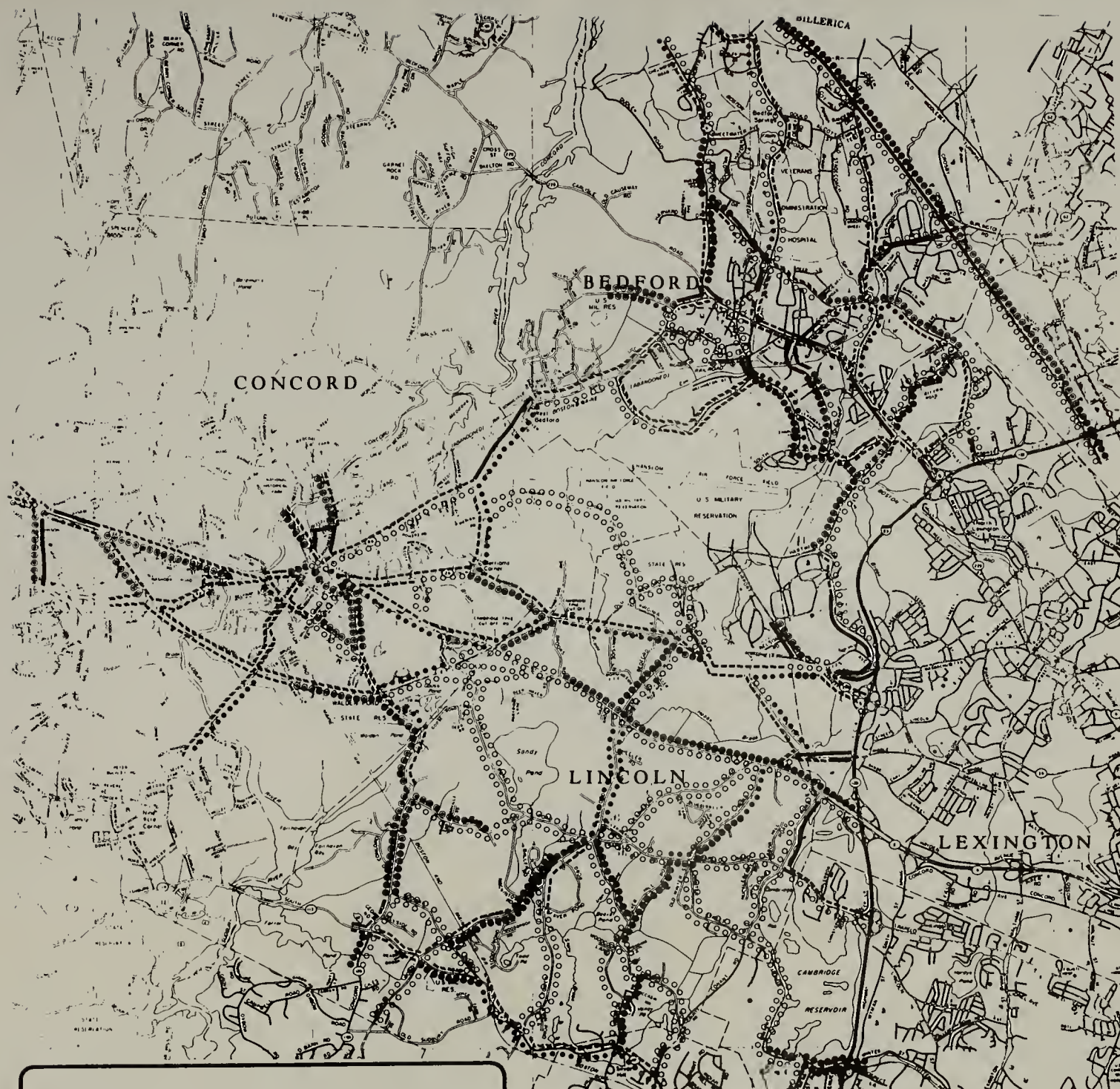
LEGEND

CONGESTION LEVEL	VOLUME/CAPACITY RANGE	DESCRIPTION OF TRAVEL CONDITIONS
○○○○	0.00-0.59	FREE VOLUMES OF RELATIVELY FREE FLOWING TRAFFIC
●●●●	0.60-0.79	MODERATE VOLUMES OF RELATIVELY SMOOTHLY FLOWING TRAFFIC
●●●●	0.80-0.94	MODERATE TO HEAVY VOLUMES OF RELATIVELY SLOW BUT STEADILY MOVING TRAFFIC
----	0.95-1.14	HEAVY VOLUMES OF RELATIVELY SLOW TRAFFIC SUBJECT TO FLUCTUATIONS IN OPERATING CONDITIONS AND RESTRICTIONS TO FLOW OF A TEMPORARY NATURE
----	1.15-1.49	SEVERE CONGESTION THAT SUBSTANTIALLY EXCEEDS THE CAPACITY OF THE HIGHWAY WITH FREQUENT UNSTABLE FLOW AND STOPPAGE OCCURRING FOR EXTENDED PERIODS OF TIME POSSIBLE
----	1.50*	



LEGEND

CONGESTION LEVEL	VOLUME/CAPACITY RANGE	DESCRIPTION OF TRAVEL CONDITIONS
0 0 0 0	1 00.0-0.59	LIGHT VOLUMES OF RELATIVELY FREE FLOWING TRAFFIC
• • • • •	2 0.60-0.79	MODERATE VOLUMES OF RELATIVELY SMOOTHLY FLOWING TRAFFIC
• • • •	3 0.80-0.94	MODERATE TO HEAVY VOLUMES OF RELATIVELY SLOW BUT STEADILY MOVING TRAFFIC
— — — —	4 0.95-1.14	HEAVY VOLUMES OF RELATIVELY SLOW TRAFFIC, SUBJECT TO FLUCTUATIONS IN OPERATING CONDITIONS AND RESTRICTIONS TO FLOW OF A TEMPORARY NATURE
— — — —	5 1.15-1.49	VOLUMES THAT SUBSTANTIALLY EXCEED THE CAPACITY OF THE ROADWAY WITH RESULTANT UNSTABLE FLOW AND STOPPAGE OCCURRING FOR EXTENDED PERIODS OF TIME POSSIBLE
— — — —	6 1.50+	



LEGEND

CONGESTION LEVEL	VOLUME/CAPACITY RANGE	DESCRIPTION OF TRAVEL CONDITIONS
○○○○	0.00-0.59	FREE FLOWING TRAFFIC
●●●●	0.60-0.79	FREE FLOWING TRAFFIC
●●●●	0.80-0.94	FREE FLOWING TRAFFIC
----	0.95-1.14	FREE FLOWING TRAFFIC
----	1.15-1.49	FREE FLOWING TRAFFIC
----	1.50+	FREE FLOWING TRAFFIC

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FIGURE
S-13



LEGEND

CONGESTION LEVEL		VOLUME/CAPACITY RANGE	DESCRIPTION OF TRAVEL CONDITIONS
○ ○ ○ ○	1	0.0-0.59	LIGHT VOLUMES OF RELATIVELY FREE FLOWING TRAFFIC
● ● ● ●	2	0.60-0.79	MODERATE VOLUMES OF RELATIVELY SMOOTHLY FLOWING TRAFFIC
● ● ● ●	3	0.80-0.94	MODERATE TO HEAVY VOLUMES OF RELATIVELY SLOW BUT STEADILY MOVING TRAFFIC
— — — —	4	0.95-1.14	HEAVY VOLUMES OF RELATIVELY SLOW TRAFFIC, SUBJECT TO FLUCTUATIONS IN OPERATING CONDITIONS AND RESTRICTIONS TO FLOW OF A TEMPORARY NATURE
— — — —	5	1.15-1.49	VOLUMES THAT SUBSTANTIALLY EXCEED THE CAPACITY OF THE ROADWAY WITH RESULTANT UNSTABLE FLOW AND STOPPAGE OCCURRING FOR EXTENDED PERIODS OF TIME POSSIBLE
— — — —	6	1.50+	

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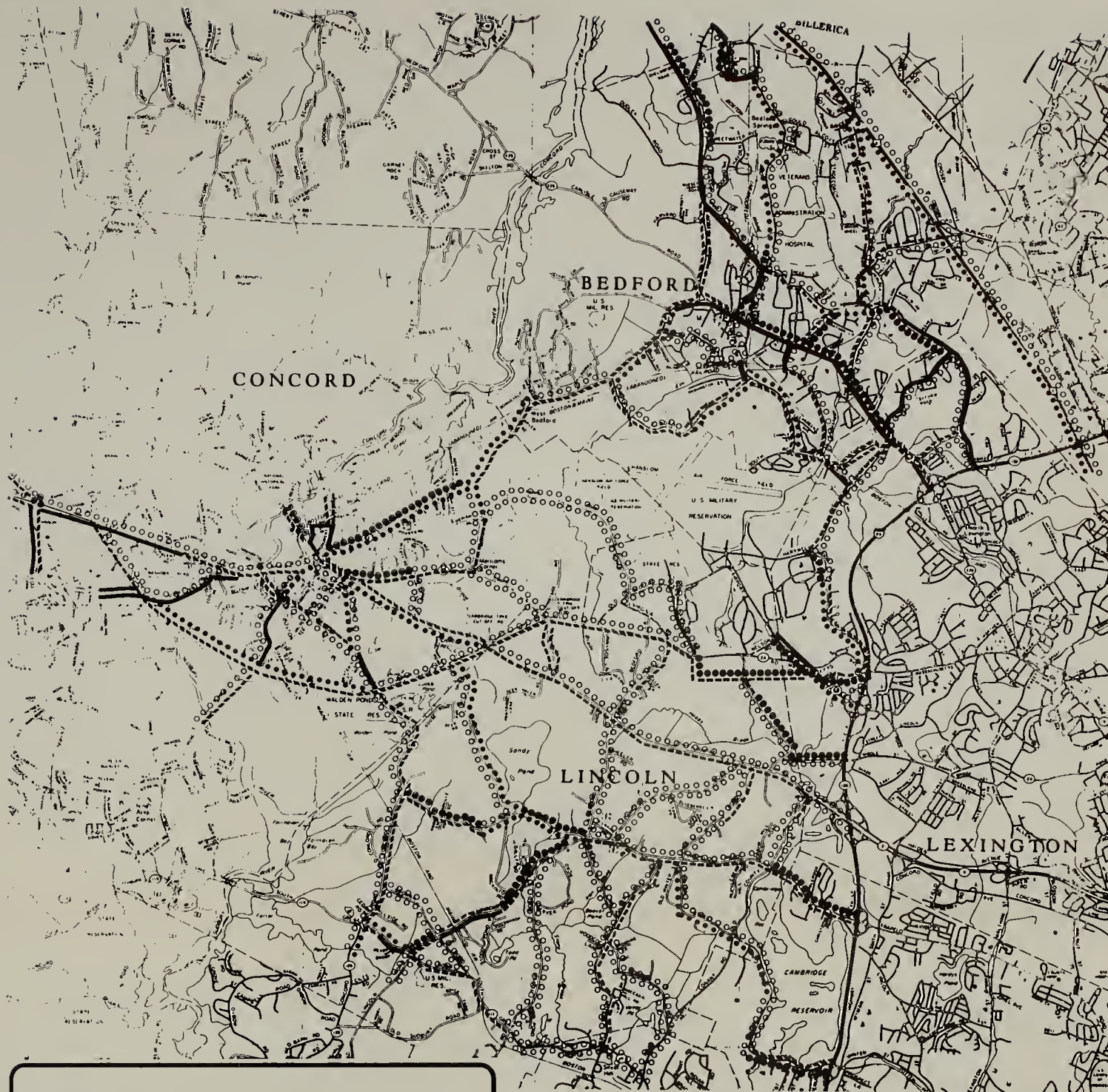
FIGURE

S-14



LEGEND

CONGESTION LEVEL	VOLUME/CAPACITY RANGE	DESCRIPTION OF TRAVEL CONDITIONS
0 0 0 0	1	0.00-0.59 LIGHT VOLUMES OF RELATIVELY FREE FLOWING TRAFFIC
• • • • •	2	0.60-0.79 MODERATE VOLUMES OF RELATIVELY SMOOTHLY FLOWING TRAFFIC
• • • •	3	0.80-0.94 MODERATE TO HEAVY VOLUMES OF RELATIVELY SLOW BUT STEADILY MOVING TRAFFIC
- - - -	4	0.95-1.14 HEAVY VOLUMES OF RELATIVELY SLOW TRAFFIC SUBJECT TO FLUCTUATIONS IN OPERATING CONDITIONS AND RESTRICTIONS TO FLOW OF A TEMPORARY NATURE
- - - - -	5	1.15-1.49 VOLUMES THAT SUBSTANTIALLY EXCEED THE CAPACITY OF THE ROADWAY WITH RESULTANT UNSTABLE FLOW AND STOPPAGE OCCURRING FOR EXTENDED PERIODS OF TIME POSSIBLE
— — — — —	6	1.50+



LEGEND

CONGESTION LEVEL	VOLUME/CAPACITY RANGE	DESCRIPTION OF TRAVEL CONDITIONS
○ ○ ○ ○	1 00-0-59	LIGHT VOLUMES OF RELATIVELY FREE FLOWING TRAFFIC
● ● ● ●	2 0-60-79	MODERATE VOLUMES OF RELATIVELY SMOOTHLY FLOWING TRAFFIC
● ● ● ●	3 0-80-94	MODERATE TO HEAVY VOLUMES OF RELATIVELY SLOW BUT STEADILY MOVING TRAFFIC
— — — —	4 0-95-114	HEAVY VOLUMES OF RELATIVELY SLOW TRAFFIC SUBJECT TO FLUCTUATIONS IN OPERATING CONDITIONS AND RESTRICTIONS TO FLOW OF A HIGH PRIORITY NATURE
— — — —	5 1-15-149	VEHICLES THAT SUBSTANTIALLY EXCEEDED THE CAPACITY OF THE ROADWAY WITH RESULTANT UNSTABLE FLOW AND STOPPAGE OCCURRING FOR EXTENDED PERIODS OF TIME POSSIBLE
— — — —	6 1-50+	

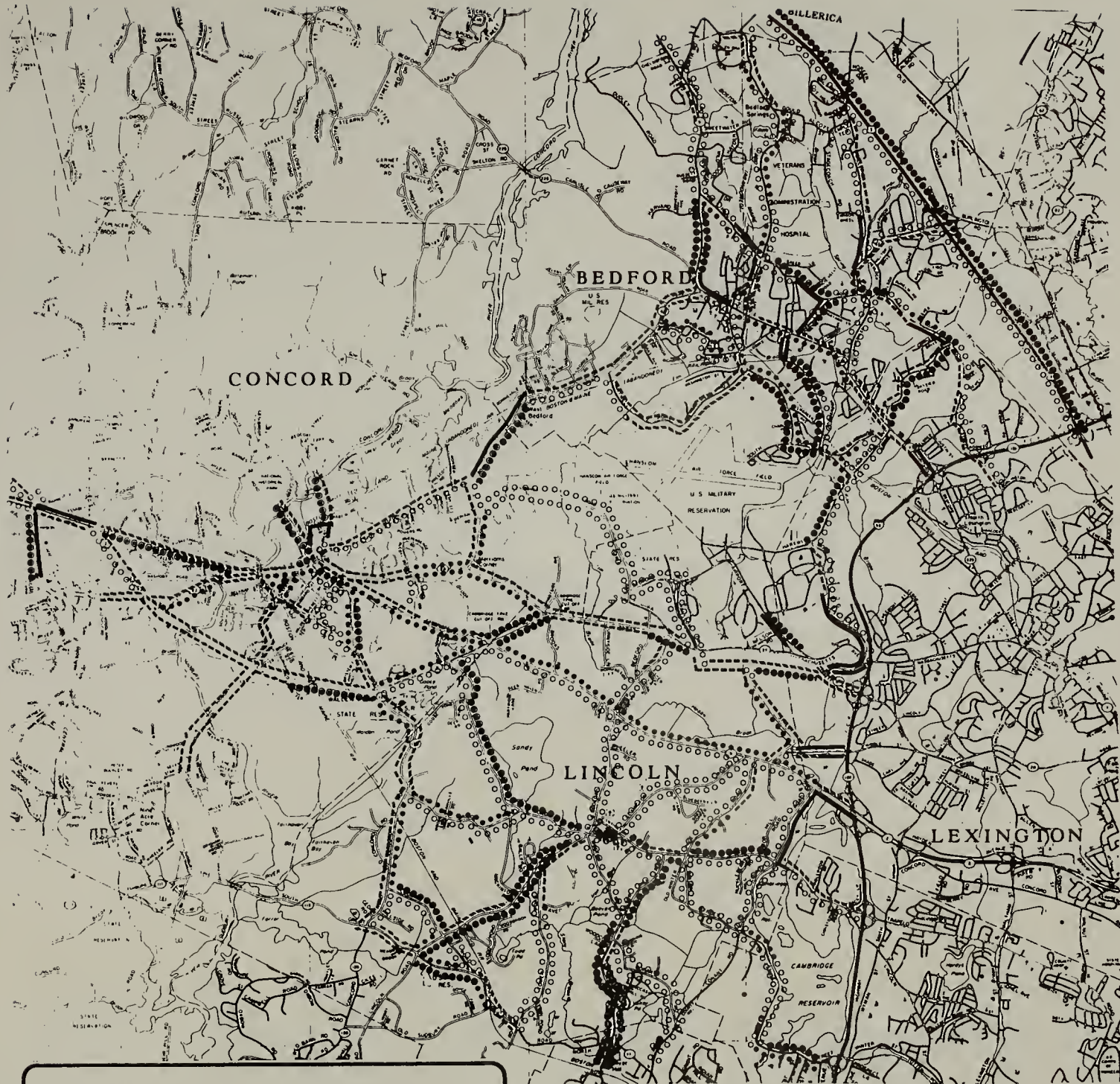
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PACKAGE 6 TRAVEL CONDITIONS, AM PEAK HOUR

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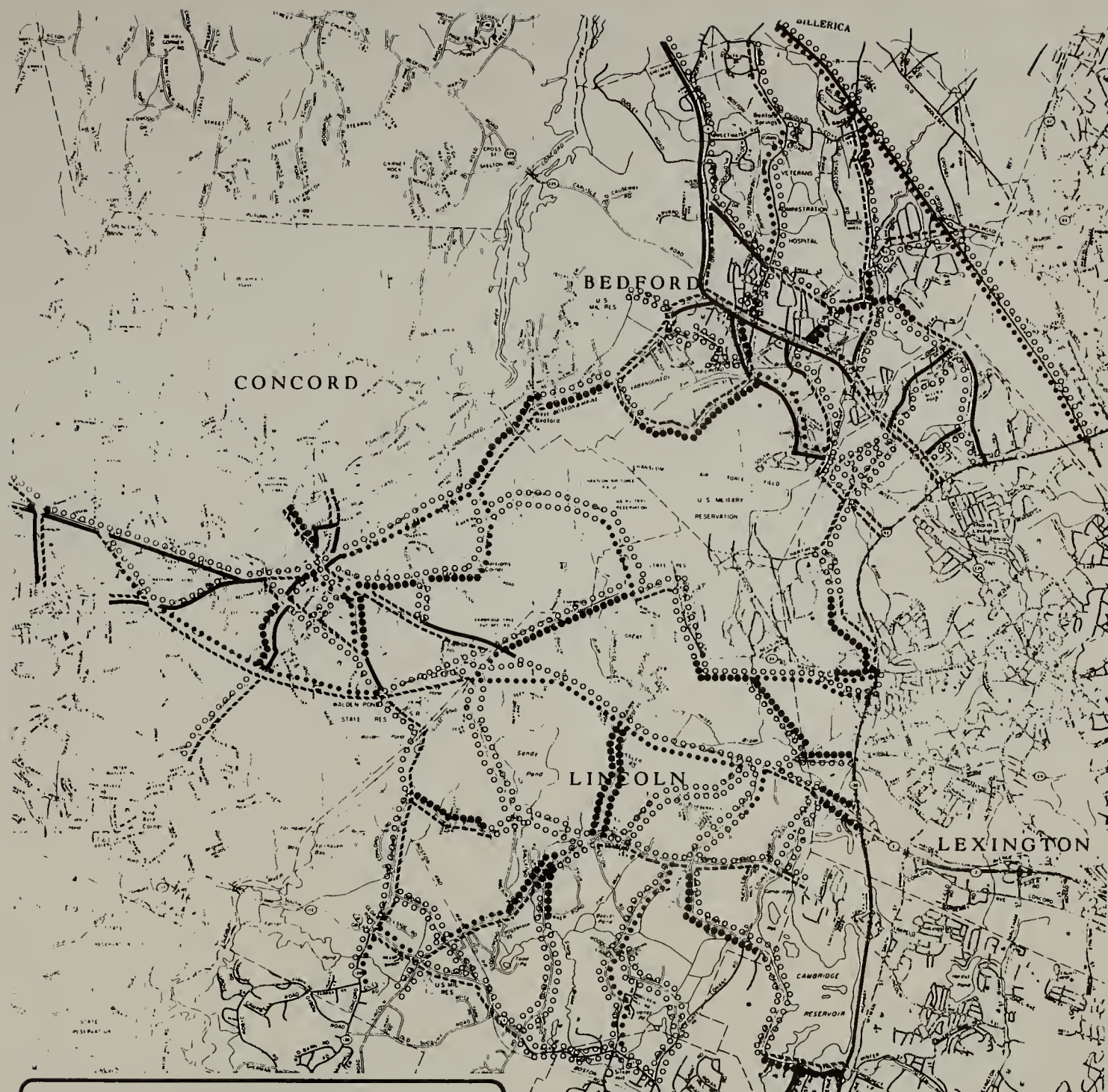
FIGURE
S-16



LEGEND

CONGESTION LEVEL	VOLUME/CAPACITY RANGE	DESCRIPTION OF TRAVEL CONDITIONS
○○○○	00.0-0.59	LIGHT VOLUMES OR RELATIVELY FREE FLOWING TRAFFIC
●●●●●	0.60-0.79	MODERATE VOLUMES OR RELATIVELY SMOOTHLY FLOWING TRAFFIC
●●●●	0.80-0.94	MODERATE TO HEAVY VOLUMES OF RELATIVELY SLOW BUT STEADILY MOVING TRAFFIC
-----	0.95-1.14	HEAVY VOLUMES OF RELATIVELY SLOW TRAFFIC SUBJECT TO FLUCTUATIONS IN OPERATING CONDITIONS AND RESTRICTIONS TO FLOW OF A TEMPORARY NATURE
-----	1.15-1.40	VOLUMES THAT SUBSTANTIALLY EXCEED THE CAPACITY OF THE ROADWAY WITHIN THE LAST MEASURABLE FLOW AND STOPPAGE OCCURRING ON EXTENSIVE PORTIONS OF TIME POSSIBLE
-----	1.50*	





LEGEND

CONGESTION LEVEL	VOLUME/CAPACITY RANGE	DESCRIPTION OF TRAVEL CONDITIONS
○ ○ ○ ○	00.0-0.59	FREE VOLUMES OR RELATIVELY FREE FLOWING TRAFFIC
● ● ● ●	0.60-0.79	MODERATE VOLUMES OR RELATIVELY SMOOTHLY FLOWING TRAFFIC
● ● ● ●	0.80-0.94	MODERATE TO HEAVY VOLUMES OR RELATIVELY SLOW BUT STEADILY MOVING TRAFFIC
— — — —	0.95-1.14	HEAVY VOLUMES OR RELATIVELY SLOW TRAFFIC SUBJECT TO FLUCTUATIONS IN OPERATING CONDITIONS AND RESTRICTIONS TO FLOW OF A TEMPORARY NATURE
— — — —	1.15-1.49	VOLUMES THAT SUBSTANTIALLY EXCEED THE CAPACITY OF THE ROADWAY WITH RESULTANT UNSTABLE FLOW AND STOPPAGE OCCURRING FOR EXTENDED PERIODS OF TIME POSSIBLE
— — — —	1.50*	

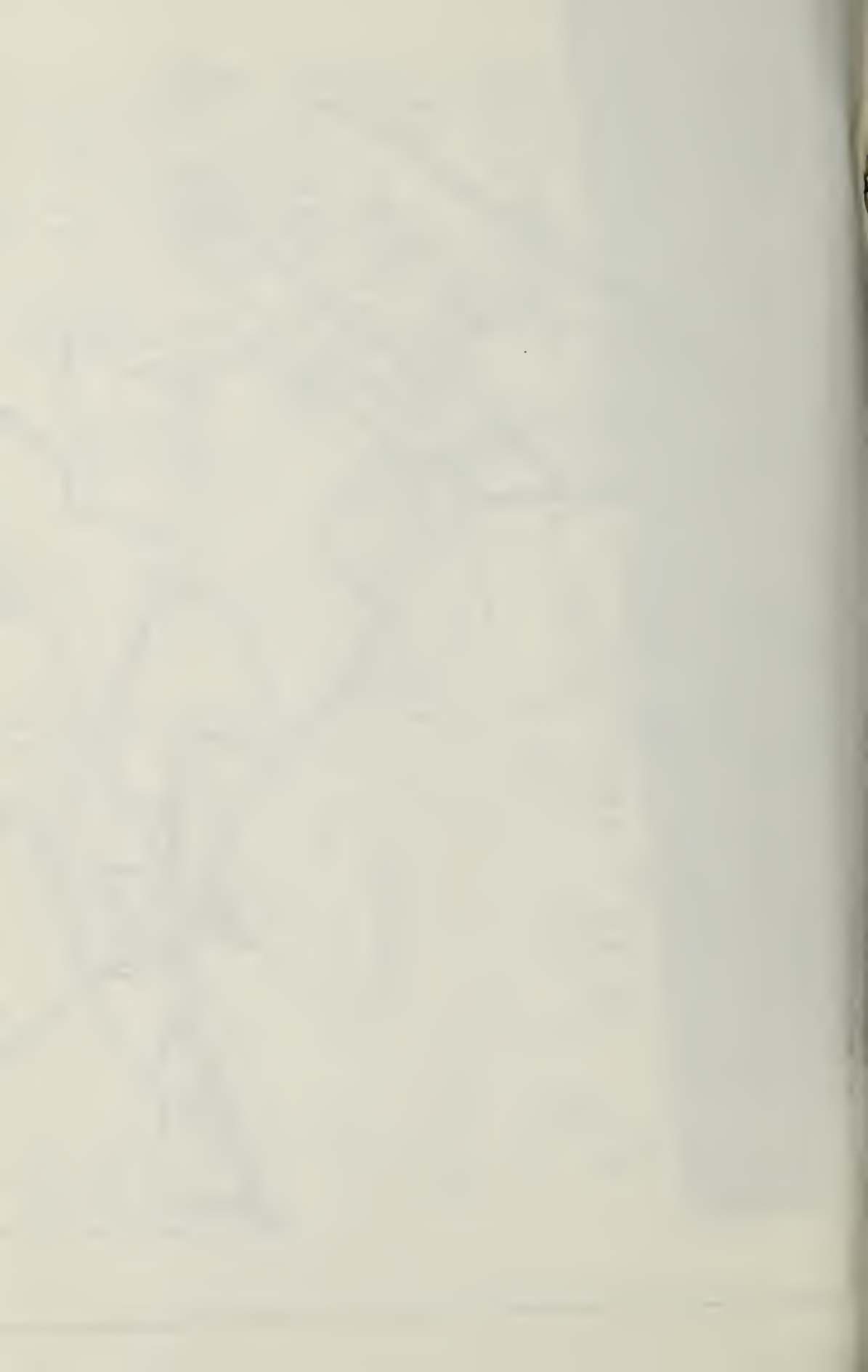
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PACKAGE 7 TRAVEL CONDITIONS, AM PEAK HOUR

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FIGURE
S-18





LEGEND

CONGESTION LEVEL	VOLUME/CAPACITY RANGE	DESCRIPTION OF TRAVEL CONDITIONS
○○○○	1 00-0-0.59	LIGHT VOLUMES OF RELATIVELY FREE FLOWING TRAFFIC
●●●●	2 0.60-0.79	MODERATE VOLUMES OF RELATIVELY SMOOTHLY FLOWING TRAFFIC
●●●●	3 0.80-0.94	MODERATE TO HEAVY VOLUMES OF RELATIVELY SLOW BUT STEADILY MOVING TRAFFIC
----	4 0.95-1.14	HEAVY VOLUMES OF RELATIVELY SLOW TRAFFIC SUBJECT TO FLUCTUATIONS IN OPERATING CONDITIONS AND RESTRICTIONS TO FLOW OF A TEMPORARY NATURE
----	5 1.15-1.49	VOLUMES THAT SUBSTANTIALLY EXCEED THE CAPACITY OF THE ROADWAY WITH RESULTANT UNSTABLE FLOW AND STOPPAGE OCCURRING FOR EXTENDED PERIODS OF TIME POSSIBLE
----	6 1.50+	

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PACKAGE 7 TRAVEL CONDITIONS, PM PEAK HOUR

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FIGURE

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